Vegetation Monitoring Protocol for Klamath Network Parks

Standard Operating Procedure (SOP) #9: Vegetation Database

Version 1.00

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This SOP provides the details on the design and set-up of the database that is to be used to enter data for the vegetation and whitebark pine vital signs monitoring effort including the relationship diagram and data dictionary. To learn how to use the database to enter data, see SOP#10: Data Entry.

Database Set-up

There are a variety of databases that have been developed to store and manage vegetation data. The Klamath Network looked at several of these databases, but we were unable to find a database that could meet the majority of the needs of our project. Therefore, we have developed a database using the Natural Resource Database Template (NRDT) developed by the National Park Service. The NRDT:

- Provides both a data interchange standard and a standard MS Access database core that allow flexibility in application design.
- Serves as a starting point for application development that can be extended as necessary to accommodate any inventory or monitoring field sampling protocol.
- Standardizes location and observation data to facilitate the integration of datasets.
- Acts as a design platform for developing database applications in MS Access allowing users to enter, edit, display, summarize, and generate reports for inventory or monitoring datasets.
- Integrates with other I&M data management systems and data standards including the NPS Data Store, Geographic Information System (GIS) tools and data, the NPS GIS Committee Data Layers Standard, and the NPS Metadata Profile.

The NRDT Front-end Application Builder (FAB) is a Microsoft Access file that is intended to be used by developers of NRDT applications to create a front-end (user-interface) to an NRDT v.3.2 back-end (database). The FAB comes with many built-in features, including:

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- table linking utility
- data backup
- compaction
- lookup table management
- main menu
- standardized data entry forms for core NRDT v.3.2 tables
- standardized data "gateway" form for retrieving records

Master and Project Database

The Klamath Network plans on maintaining a Master Vegetation Database, which will house the verified and validated data that are collected using this protocol (Figure 1) and the whitebark pine vital sign monitoring effort. Members of the KLMN will have read-only access to this database and can use it to conduct data summaries and use the data to develop Analysis and Synthesis reports or publications. A project database will be provided to each crew at the beginning of the field season. Crews will use the project database (on a tablet computer) to enter data collected at each monitoring site. After validation and verification procedures have been followed, this database will be used to create summaries and conduct data analysis for annual reports. At the end of the year, the data from the project database will be uploaded to the master database for long-term storage and future analysis.

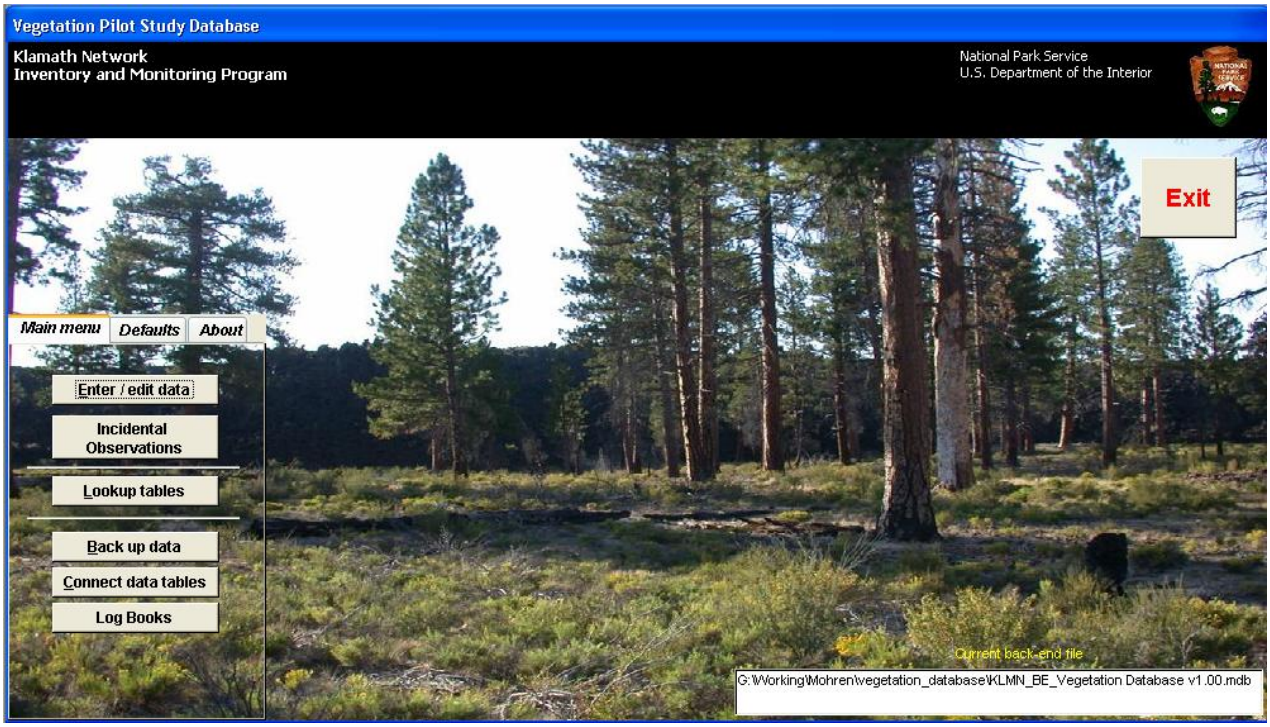

Figure 1. Main screen of the KLMN vegetation monitoring database.

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Preparing the Databases for Field Work

Updating Contact Information: Prior to starting the field work, the Data Manager should obtain a COPY of the blank database template. This template should be located in the Vegetation Data subfolder of the Vegetation Monitoring folder. As discussed in SOP #1: Field Work Preparation, the Data Manager should obtain a list of contact information for each person involved in the vegetation monitoring effort. This data should be used to enter as much of the contact information into the project database as possible. To enter this information, the Data Manager should complete the following steps.

1. Open the back-end of the database and open the table called tlu_Contacts. Delete any of the contacts that are not on the list of project staff obtained from the Project Lead.
2. Once done, open the front-end of the database and click on the "Enter / Edit Data" command button.
3. On the "Set application default values" form, use the drop down box in the "User" field to make sure names for each person involved in this project are on the list. If a person needs to be added, click the "New User" command button.
4. Enter the following fields for each person involved in the monitoring effort this year.
    a. First Name
    b. Last Name
    c. Organization
    d. Position / Title
    e. Work Phone Number
    f. Email Address
    g. Address Type
    h. Address, City, State, and Zip
    I. Country
5. Once you have completed entering the data for each person, click the "Close" button.
6. Repeat step 3-4 until all project staff have been entered.

Updating Location Information: As part of this project, each time a field crew visits a park, they will survey the same sites. Implementing this design will allow the Data Manager the opportunity to preload all the sites into the database template. Provided below are the methods on how to preload the sites. In addition, these methods can be followed to add new sites to the database if needed. As discussed in SOP #1: Field Work Preparation, the Data Manager should obtain a GIS file of the sites that the Network plans on monitoring. These data should be used to enter as much of the site information into the project database as possible. To enter this information, the Data Manager should complete the following steps.

1. Click the "OK" button on the "Set application default values" form.
2. On the "Sample Data Gateway" form, click "Add a New Record."
3. On the "Data Entry" form, next to the "Location" field, click the "Add New" command button.
4. Complete the following fields for each site in the GIS shapefile.
    a. Network Code
    b. Park Code
    c. Zone

d. Site Type
e. Location Name
f. Watershed
g. Township, Range, and Section
h. USGS 7.5' Quad Map Name

5. Once you have entered the information for each site, click the "Close" button.
6. Close all the forms until you are back at the main screen.

Updating Species Lists: The next thing that needs to be done is updating the species list for the parks that will be surveyed that year. To complete this task, the Data Manager should do the following:

1. Download the entire species list from NPSpecies for the park that will be surveyed.
2. In the project database, from the main menu, hit the F11 button. This should bring up the database view of the database.
3. Open the tlu_Species_List table and reorganize the downloaded species list (step 1 above) so it matches the file structure of this table.
4. Make a copy of the tlu_Species_List table and rename it tlu_Species_List_YYYY, where the year is the year the protocol was previously implemented.
5. Delete all the records in the tlu_Species_List table.
6. Copy the records from the species list you downloaded and reorganized and paste those records into the tlu_Species_List table.
7. Run the query called: qry_Species_Update.
8. Open the table: tlu_Species_List and populate any "Lifeform" cells that do not have a value.
9. You now have an updated species list for the database and have saved the species list from the previous year.

Setting up the Tablet Computer: Once you have completed updating the database, do the following to get the database onto the tablet computer that the field crews will use to enter data.

1. In the Vegetation_Data subfolder of the Vegetation Monitoring folder, look for a folder called "field crew support materials".
2. Make certain this folder contains the following:
    a. The most up-to-date vegetation protocol.
    b. A blank project database with the corrections / updates listed above incorporated.
    c. Vegetation identification cards.
    d. A blank copy of all log books (equipment, training, datasheet, and events).
    e. Any supporting documentation that might help crews in the field.
    f. A blank data entry sheet.
3. Once these items have been updated, login to the tablet computer (using the Field Crew login) and place a copy of the folder on the C drive. Make a shortcut to the folder and place it on the desktop.
4. Rename the database by adding the crew member's initials to the end of the current naming convention.
5. Open the front-end of the database to make certain to link it to the back-end database.

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Database Structure

Updating Database Structure: A Metadata Interview form and updated data dictionary are submitted at the end of the year which should indicate if any changes to the database are needed. In addition, it is always a good idea to check with the Project Lead prior to the start of the field season to see if there are additional changes needed. At this point, you should make any necessary changes to the structure of the database. Brief descriptions of the database elements are provide in the tables (Tables 1 and 2), data dictionary, and relational diagram (Figure 2) provided below.

Tables, Queries, Forms, Reports, Modules, and Macros: There are a variety of tables, queries, forms, modules, macros, and reports used in this database. Tables are located in the back-end database while the other object types are located in the front-end of the database. A brief description of the tables and forms in the databases are provided in tables 1 and 2 below.

Table 1. A brief description of the tables that are in the KLMN backend vegetation database.

Table Name	Description
tbl_Db_Meta	This table contains the database description and links to I&M metadata tools.
tbl_Db_Revision	This tables stores the revision history of the database
tbl_Densiometer	This table stores data related to cover
tbl_Distrubance	This table stores data related to disturbance at the site
tbl_Event_Details	This table holds the "Notes" field which links to the tbl_Events
tbl_Events	This table contains the general information about a visit to the site
tbl_Incidental	This table contains the records of incidental sighting by the field crew
tbl_Locations	This table stores the information about the location of the monitoring plots
tbl_Litter_Duff	This table stores the information related to the litter and duff measurements
tbl_Nested_Plot	This table stores the information related to species found in the nested plots
tbl_Nested_Plot_Substrate	This table stores the information related to substrate found in the nested plots
tbl_Overstory_Dead_Tree	This table stores the information related to snags
tbl_Overstory_WBP	This table stores information related to whitebark pine.
tbl_Seedling_Density	This table stores the information related to seedlings
tbl_Woody_Stem	This table stores the information related to woody debris in the smaller size class
tbl_Woody_Stem_Large	This table stores the information related to woody debris in the larger size class
tbl_Shrub	This table stores data related to shrubs on the site.
tbl_Sites	Stores data about the site.
tbl_Photographs	This table stores the data linked to the photographs for each plot
tlu_Contacts	This is a lookup table that contains information about individuals working on this project
tlu_Enumerations	This is a lookup table that contains the lookup values for all pick list with the exception of contact and species list information.
tlu_Species_List	This is a lookup table that contains information about the species that occur in each park
xref_Event_Contacts	This is a cross-reference table between events and contacts.

Table 2. A brief description of the forms that are in the KLMN backend vegetation database.

Form Name	Description
frm_Contacts	This form is used to enter the contact information for each person working on the protocol.
frm_Data_Entry	This form is used to enter data about the visit to a site
frm_Data_Gateway	This form is used to see and access all records in the database
frm_Event_Group	This form is used to enter comments about the visit
frm_Incidental	This form is used to enter data about incidental observations
frm_Locations	This form is used to enter data about the location of the monitoring plots
frm_Metadata_Display	This form is used to display the metadata of the database
frm_Metadata_Edit	This form is used to enter the database metadata
frm_Sites	This form is used to enter data about the site
frm_Switchboard	This form is the main screen of the database
fsub_Densiometer	This form is used to enter data about cover
fsub_Disturbance	This form is used to enter data about disturbances at the plot
fsub_Litter_Duff	This form is used to enter data about litter and duff
fsub_Nested_Plot	This form is used to enter data about species and cover at the nested plot
fsub_Nested_Plot_Substrate	This form is used to enter data about the substrate located at the nested plot
fsub_Overstory_Dead	This form is used to enter data about overstory species and nags
Fsub_Overstory_WPB	This form is used to enter data related to the whitebark pine monitoring
fsub_Photographs	This form is used to enter metadata for each photograph
fsub_Seedlings	This form is used to enter data about seedlings
fsub_Woody_Large	This form is used to enter data about large woody debris
fsub_Woody_Stem	This form is used to enter data about small woody debris

Relational Diagram: A relationship diagram presenting the relationship of the tables in the protocol database is provided below (Figure 1). As you can from this diagram, the core of the database center around the visits (tbl_events) to a site. Location and site specific data are linked to the visit using the unique identifiers labeled “Event_ID” and “Location_ID.”

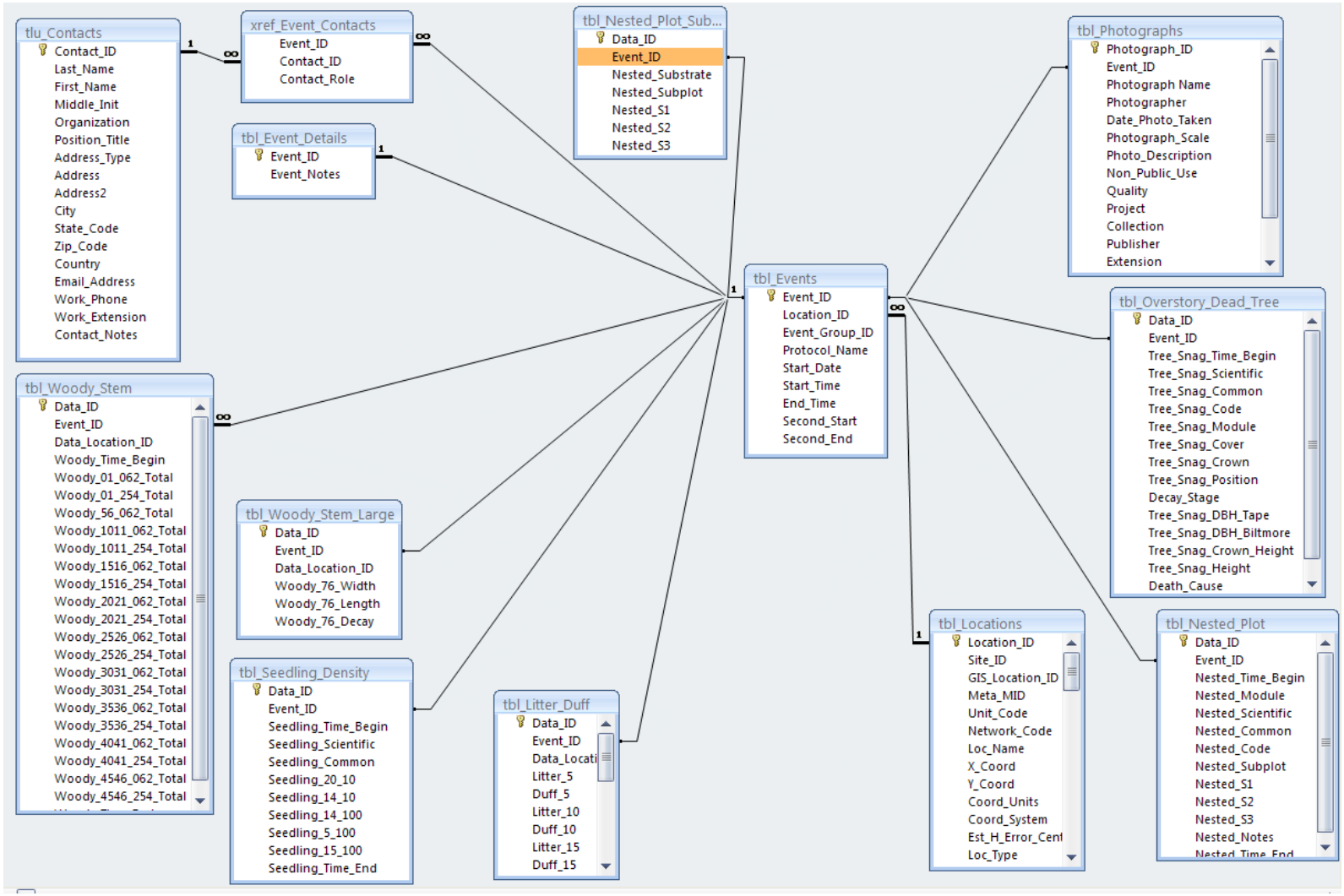

Figure 2. Relational diagram of the back-end database used to record vegetation monitoring data.

Data Dictionary. The following tables provided the data dictionary for the database used as part of this monitoring effort.

tbl_Metadata	This table provides some general metadata about this database							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Db_Meta_ID	M	Text	50	NA	NA	NA	NA	Local primary key
Db_Desc	M	Memo		NA	NA	NA	NA	Description of the database purpose
Meta_MID	M	Text	255	NA	NA	NA	NA	Link to NPS Data Store
DSC_GUID	M	Text	50	NA	NA	NA	NA	Link to I&M Dataset Catalog desktop metadata tool
Meta_File_Name	M	Text	50	NA	NA	NA	NA	Name of the metadata file that describes this NRDT data file (must be in the same directory as this data file)

tbl_Db_Revision	This table contains information on the revision history of the database							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Revision_ID	M	Text	50	NA	NA	NA	NA	Database revision (version) number or code
Revision_Contact_ID	M	Text	50	NA	NA	NA	NA	Link to tlu_Contacts
Db_Meta_ID	M	Text	50	NA	NA	NA	NA	Link to tbl_DB_Meta
Revision_Date	M	Date	8	NA	NA	NA	NA	Database revision date
Revision_Reason	M	Memo	NA	NA	NA	NA	NA	Reason for the database revision
Revision_Desc	M	Memo	NA	NA	NA	NA	NA	Revision description

tbl_reports	This table contains information about canned reports that are utilized as part of the database reporting tool							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Report_Name	M	Text	100	NA	All reports in the front end of the database	NA	NA	Name of the report, analysis, or raw data
Report_Title	M	Text	100	NA		NA	NA	Title of the report, analysis, or raw data
Report_Seq	M	Long Integer	4	0		NA	NA	A sequence so you can sort the reports
Report_ID	M	Text	100	NA		NA	NA	A unique value for this record

tlu_Contacts	This table contains the contact information for individuals working on this project.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Contact_ID	M	Text	50	NA		NA	NA	Contact identifier
Last_Name	M	Text	50	NA		NA	NA	Last name
First_Name	M	Text	50	NA		NA	NA	First name
Middle_Init	M	Text	4	NA		NA	NA	Middle initial

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Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Organization	M	Text	50	NA	NPS, SOU	NA	NA	Organization or employer
Position_Title	M	Text	50	NA		NA	NA	Title or position description
Address_Type	M	Text	50	NA	mailing, mailing and physical, physical	NA	NA	Address type
Address	M	Text	50	NA		NA	NA	Street address
Address2	MA	Text	50	NA		NA	NA	Address line 2, suite, apartment number
City	M	Text	50	NA		NA	NA	City or town
State_Code	M	Text	8	NA	CA, OR	NA	NA	State or province
Zip_Code	M	Text	50	NA		NA	NA	Zip code
Country	M	Text	50	NA	USA	NA	NA	Country
Email_Address	M	Text	50	NA		NA	NA	E-mail address
Work_Phone	M	Text	50	NA		NA	NA	Phone number
Work_Extension	M	Text	50	NA		NA	NA	Phone extension
Contact_Notes	MA	Memo	0	NA		NA	NA	Contact notes

xref_Event_Contact This table crosswalks the event table and the contacts table.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Event_ID	M	Text	50	NA		NA	NA	Link to tbl_Events
Contact_ID	M	Text	50	NA		NA	NA	Link to tlu_Contacts
Contact_Role	MA	Text	50	NA	Crew Leader, Crew Member, Data Manager, Data Recorder, Observer, Principle Investigator	NA	NA	The contact's role in the protocol

tlu_Enumerations This table contains picklist values for all fields except the species fields.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Enum_Code	M	Text	50	NA	NA	NA	NA	Code for lookup values
Enum_Description	MA	Memo	NA	NA	NA	NA	NA	Lookup value description
Enum_Group	M	Text	50	NA	NA	NA	NA	Category for lookup value
Sort_Order	M	Integer	4	0	NA	NA	NA	Order in which to sort lookup values

tlu_Species_List A lookup table that provides species names and ITIS numbers from NPSpecies

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Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Park	M	Text	255	NA	CRLA, LABE, LAVO, ORCA, REDW, WHIS	NA	NA	Park where the species was documented
Category	M	Text	255	NA	Amphibians, Birds, Fish, Mammals, Reptiles, Vascular Plants	NA	NA	Taxon group the species belongs too
Family	M	Text	255	NA	Families listed in ITIS	NA	NA	Family the species belongs too
Order	M	Text	255	NA	Orders listed in ITIS	NA	NA	Order the species belongs too
TSN	M	Text	50	NA		NA	NA	ITIS unique number for the species
Scientific_Name	M	Text	255	NA	Scientific Names listed in ITIS	NA	NA	Scientific name of the species
Lifeform	M	Text	255	NA	Tree, Shrub, SubShrub	NA	NA	Divides the species into Tree, Shrub, or SubShrub
Common_Name	M	Text	255	NA	Common Names listed in ITIS	NA	NA	Common names used for the species
Park-Status	M	Text	255	NA	Present in Park, Probably Present, Unconfirmed, Encroaching, Historic	NA	NA	The status of the species in the park
Abundance	M	Text	255	NA	Abundant, Common, Uncommon, Rare, Occasional, Unknown, NA	NA	NA	The abundance of the species in the park
Residency	M	Text	255	NA	Breeder, Resident, Migratory, Vagrant, Unknown, NA	NA	NA	The residency status of the species in the park
Nativity	M	Text	255	NA	Native, Non-Native, Unknown, NA	NA	NA	Divides the species by native or non-native
Cultivation	M	Text	255	NA	Cultivated, Persistent, Not Cultivated, Unknown	NA	NA	Cultivation status of the species
Weedy	M	Text	255	NA	Yes / No	NA	NA	Invasive species or not
Tree_Class	M	Text	50	NA	Conifer, Hardwood	NA	NA	Divides the trees into conifer or hardwood

tbl_Woody_Stem_Large This table contains the data related to large woody debris on the site.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50	NA	NA	NA	NA	Field data table row identifier
Event_ID	M	Text	50	NA	NA	NA	NA	Link to tbl_Events
Woody_76_Width	MA	Long Integer	4	0	NA	7.6	150	Width of any woody debris along the transect that is >7.6cm
Woody_76_Length	MA	Long Integer	4	0	NA	0.01	50	Length of any woody debris along the transect that is >7.6cm
Woody_76_Decay	MA	Long Integer	4	0	1,2,3,4,5	1	5	Decay Class of any woody debris along the transect that is >7.6cm

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tbl_Woody_Stem	This table contains the data related to small woody debris on the site.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier (Data_ID)
Event_ID	M	Text	50					Link to tbl_Events (Event_ID)
Data_Location_ID	MA	Text	50					Optional link to tbl_Data_Locations (Data_Loc_ID)
Woody_01_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 0-1 meters
Woody_01_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 0-1 meters
Woody_02_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 0-1 meters
Woody_56_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 5-6 meters
Woody_56_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 5-6 meters
Woody_57_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 5-6 meters
Woody_1011_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 10-11 meters
Woody_1011_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 10-11 meters
Woody_1012_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 10-11 meters
Woody_1516_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 15-16 meters
Woody_1516_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 15-16 meters
Woody_1517_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 15-16 meters
Woody_2021_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 20-21 meters
Woody_2021_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 20-21 meters
Woody_2022_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 20-21 meters

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Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Woody_2526_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 25-26 meters
Woody_2526_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 25-26 meters
Woody_2527_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 25-26 meters
Woody_3031_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 30-311 meters
Woody_3031_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 30-311 meters
Woody_3032_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 30-311 meters
Woody_3536_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 35-36 meters
Woody_3536_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 35-36 meters
Woody_3537_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 35-36 meters
Woody_4041_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 40-41 meters
Woody_4041_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 40-41 meters
Woody_4042_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 40-41 meters
Woody_4546_062_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0-0.62cm size class at 45-46 meters
Woody_4546_254_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 0.63-2.54cm size class at 45-46 meters
Woody_4547_255_Total	M	Long Integer	4	0		0	100	Total number of down wood in the 2.55-7.6cm size class at 45-46 meters

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tbl_Seedling_Denisty	This table contains information related to seedling density.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Seedling_Scientific	M	Text	50					Scientific name of the species
Seedling_Common	M	Text	50					Common name of the species
Seedling_15	M	Long Integer	4	0		0	100	Seedlings < 15 cm tall in the plot by species
Seedling_15_Dead	MA	Long Integer	1					Dead seedlings < 15 cm tall in the plots by species If
Seedling_15_254	M	Long Integer	4	0		0	50	Saplings 15 cm tall to 2.54 cm DBH in the plot by species
Seedling_15_254_Dead	MA	Long Integer	1					Dead saplings 15 cm tall to 2.54 cm DBH in the plot by species .
Seedling_254_5	M	Long Integer	4	0		0	50	Saplings 2.54 – 5 cm DBH in the plot by species the plot
Seedling_254_5_Dead	MA	Long Integer	1					Dead saplings 2.54 – 5 cm DBH in the plot by species
Seedling_5_10	M	Long Integer	4	0		0	50	Saplings 5-10 cm DBH in the plot by species
Seedling_5_10_Dead	MA	Long Integer	1					Dead saplings 5-10 cm DBH in the plot by speciesf
Seedling_10_15	M	Long Integer	4	0		0	50	Saplings 10-15 cm DBH in the plot by species
Seedling_10_15_Dead	MA	Long Integer	1					Dead splings 10-15 cm DBH in the plot by species
Seedling_Plot	M	Text	2			1	10	Plot where you collected the data

tbl_Photograph	This table contains the metadata for photographs taken while at a site.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50	NA	NA	NA	NA	Unique identifier for the photograph
Event_ID	M	Text	50	NA	NA	NA	NA	Unique Identifier in tbl_Locations for the site
Photograph Name	M	Text	50	NA	NA	NA	NA	Name of the photograph
Photographer	M	Text	50	NA	tlu_Contacts	NA	NA	Individual who took the picture
Date_Photo_Taken	M	Date	8	NA	NA	NA	NA	Date the photograph was taken
Photo_Description	M	Memo	0	NA	NA	NA	NA	Description of the Photograph
Non_Public_Use	MA	Boolean	1	NA	Yes / No	NA	NA	If checked, the NPS does not have permission to use this picture in public displays

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Quality	MA	Boolean	1	NA	Yes / No	NA	NA	If checked, this is a great picture that can be used for coverpages, websites, etc.
Project	M	Text	40	NA	NA	NA	NA	If this picture is taken as part of a project, the project name is entered here
Collection	M	Text	4	NA	KLMN	NA	NA	NPS Require field. Which collection is photograph is part belongs too.
Publisher	M	Text	3	NA	NPS	NA	NA	NPS Required Field. The person or organization that is making this image available
Resource_Type	M	Text	5	NA	Image	NA	NA	NPS Required Field. The type of product.
Extension	M	Text	4	NA	NA	NA	NA	Type of picture taken
Historic	M	Boolean	1	NA	Yes / No	NA	NA	Pictures are considered historic if they were collected prior to 2007

tbl_Overstory_Dead_Tree This table contains the information related to snags in the overstory.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Tree_Snag_Scientific	MA	Text	100		tlu_Species_List			Scientific name of the species
Tree_Snag_Common	MA	Text	100		tlu_Species_List			Common name of the species
Tree_Snag_Module	MA	Long Integer	4	0		1	10	Module where the species occurred
Tree_Tag	M	Long Integer	3	0		1		Tree tag number
Tag_Replace	M	Text	3		Yes,No			Was the tree tag replaced.
Tree_Snag_Crown	MA	Text	50		1 = No dieback, 2 = 1-25% dieback, 3 = 26-50% dieback, 4 = 51-75% dieback, 5 = > 75 % dieback, 6= broken top, 7 = dead			Crown condition based on percent dieback
Tree_Snag_PosDec	MA	Long Integer	4	0	1 = Dominant, 2 = Codominant, 3 = Intermediate, 4 = Suppressed, 5 = Open Grown			1-5 classification of the canopy position of a tree, "7" = Snag
Tree_Snag_DBH_Tape	MA	Long Integer	4	1		15	300	DBH of the tree or snag measure with a DBH tape

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Tree_Snag_DBH_Biltmore	MA	Long Integer	4	1		15	300	DBH of the tree or snag measure with a biltmore stick
Tree_Crown_Height	MA	Long Integer	4	1		0	50	Height to the crown of a tree
Tree_Snag_Height	MA	Long Integer	4	1		2	100	Total height of the snag or tree
Death_Cause	MA	Memo	0					Reason the snag is dead

tbl_Nested_Plot_Substrate	This table contains information about the substrate at each nested plot							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Nested_Substrate	M	Text	25		Bare Soil, Bryophytes, Coarse Wood, Fine Wood / Litter, Rock, Water			Type of substrate that was collected
Nested_Module	M	Long Integer	2	0		1	10	Module where the data was collected
Nested_S1	M	Long Integer	3	0		0	100	Cover of substrate

tbl_Location	This table contains general information about the plot include spatial and monumenting information.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Location_ID	M	Text	50					Location identifier
GIS_Location_ID	M	Text	50					Link to GIS feature, equivalent to NPS_Location_ID
Meta_MID	MA	Text	50					Link to NR-GIS Metadata Database
Unit_Code	M	Text	4		CRLA, LABE, LAVO, ORCA, REDW, WHIS			Park Code
Network_Code	M	Text	4		KLMN			Network Code
Loc_Name	M	Text	20					Name of the location
X_Coord	M	Double	6	0				X coordinate for the center of the plot
Y_Coord	M	Double	7	0				Y coordinate for the center of the plot
Coord_Units	M	Text	2		ft, m			Coordinate distance units
Coord_System	M	Text	3		Geo, UTM			Coordinate system
Est_H_Error_Center	M	Single	4	1				Estimated horizontal accuracy

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Loc_Unit_Center	M	Text	5		+ / -, PDOP			Type of accuracy measurement taken at the center of the plot
Loc_Type	M	Text	10		Judgement, Index, Survey			Location type category
Loc_Site_Type	M	Text	10		Alpine, Matrix, Riparian			Location type category
Watershed	M	Text	100					The watershed where the sites is located
Subwatershed	M	Text	100					The subwatershed where the site is located
Township	M	Long Integer	2	0				Part of the PLSS where the site is located
Range	M	Long Integer	2	0				Part of the PLSS where the site is located
Section	M	Long Integer	2	0		1	36	Part of the PLSS where the site is located
USGS_Quad	M	Text	50					Part of the PLSS where the site is located
X_Coord2	M	Double	6	0				X coordinate (X_Coord2) at Corner 1s (for riparian) or Corner 1(for matrix or alpine)
Y_Coord2	M	Double	7	0				Y coordinate (Y_Coord2) at Corner 1s (for riparian) or Corner 1(for matrix or alpine)
Est_H_Error_1	M	Single	4	1				Estimated horizontal accuracy (Est_H_Error) at Corner 1s (for riparian) or Corner 1(for matrix or alpine)
Loc_Unit_1	M	Text	5		+ / -, PDOP			Type of accuracy measurement taken at the 1st corner of the plot
X_Coord3	M	Double	6	0				X coordinate at Corner 1ns (for riparian) or Corner 10(for matrix or alpine)
Y_Coord3	M	Double	7	0				Y coordinate at Corner 1ns (for riparian) or Corner 10(for matrix or alpine)
Est_H_Error_2	M	Single	4	1				Estimated horizontal accuracy at Corner 1ns (for riparian) or Corner 10(for matrix or alpine)
Loc_Unit_2	M	Text	5		+ / -, PDOP			Type of accuracy measurement taken at the 1st corner of the plot
X_Coord4	M	Double	6	0				X coordinate at Corner 10s (for riparian) or Corner 5(for matrix or alpine)
Y_Coord4	M	Double	7	0				Y coordinate at Corner 10s (for riparian) or Corner 5(for matrix or alpine)
Est_H_Error_3	M	Single	4	1				Estimated horizontal accuracy at Corner 10s (for riparian) or Corner 5(for matrix or alpine)

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Loc_Unit_3	M	Text	5		+ / -, PDOP			Type of accuracy measurement taken at the 1st corner of the plot
X_Coord5	M	Double	6	0				X coordinate at Corner 10ns (for riparian) or Corner 6(for matrix or alpine)
Y_Coord5	M	Double	7	0				Y coordinate at Corner 10ns (for riparian) or Corner 6(for matrix or alpine)
Est_H_Error_4	M	Single	4	1				Estimated horizontal accuracy at Corner 10ns (for riparian) or Corner 6(for matrix or alpine)
Loc_Unit_4	M	Text	5		+ / -, PDOP			Type of accuracy measurement taken at the 1st corner of the plot
UTM_Zone	M	Long Integer	2	0	10	10	10	UTM Zone
Datum	M	Text	7		NAD83, WGS 84			Datum of mapping ellipsoid
Accuracy_Notes	M	Memo	0					Positional accuracy notes
Monument_Date	M	Date	8					Date the site was monumented (Index site only)
Macro_Position	M	Text	10		Macpos 1, Macpos 2, Macpos 3, Macpos 4, Macpos 5			Orientation of the plot as it compares to the slope
Loc_Slope_1	M	Long Integer	4	0		0	90	Slope of the vegetation plot at 1-10 (matrix, alpine) or 1 (riparian)
Loc_Slope_2	M	Long Integer	4	0		0	90	Slope of the vegetation plot at 3-8 (matrix, alpine) or 4-5 (riparian)
Loc_Slope_3	M	Long Integer	4	0		0	90	Slope of the vegetation plot at 5-9 (matrix, alpine) or 10 (riparian)
Loc_Aspect_1	M	Long Integer	4	0		1	360	Aspect of the vegetation plot at 1-10 (matrix, alpine) or 1 (riparian)
Loc_Aspect_2	M	Long Integer	4	0		1	360	Aspect of the vegetation plot at 3-8 (matrix, alpine) or 4-5 (riparian)
Loc_Aspect_3	M	Long Integer	4	0		1	360	Aspect of the vegetation plot at 5-9 (matrix, alpine) or 10 (riparian)
Loc_Elevation	M	Long Integer	4	0		0	3100	Elevation in meters of the vegetation plot
Loc_Slope_Shape	M	Text	20		Concave, Convex, Straight, Undulating			Shape of the slope at the plot
Travel_Directions	M	Memo	0					Detailed directions on how to get to the site

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Loc_Notes	M	Memo	0					General notes on the location (Loc_Notes)
Witness_1_1_10_Species	MA	Text	100		from tlu_Species_List			Species name of the witness tree used to monument the plot
Witness_1_1_10_DBH	MA	Long Integer	4	1				DBH of the witness tree used to monument the plot
Witness_1_1_10_Azimuth	MA	Long Integer	4	0		0	360	Azimuth of the witness tree used to monument the plot
Witness_1_1_10_Distance	MA	Long Integer	4	2				Distance of the witness tree used to monument the plot
Witness_2_1_10_Species	MA	Text	100		from tlu_Species_List			Species name of the witness tree used to monument the plot
Witness_2_1_10_DBH	MA	Long Integer	4	1				DBH of the witness tree used to monument the plot
Witness_2_1_10_Azimuth	MA	Long Integer	4	0		0	360	Azimuth of the witness tree used to monument the plot
Witness_2_1_10_Distance	MA	Long Integer	4	2				Distance of the witness tree used to monument the plot
Updated_Date	M	Text	50					Date of entry or last change (Upd_Date)
Site_Travel_Time	M	Date	8					Time to travel from the parking spot to the site.
Instalation_Time	M	Date	8					Time it takes to setup the site
Parking_Easting	M	Long Integer	6	0				UTM location of the spot to park so you can go to a site
Parking_Northing	M	Long Integer	7	0				UTM location of the spot to park so you can go to a site
Witness_Presence	M	Boolean	1		Yes / No			If not witness tree is available on the site, this is marked true
Center_Line	M	Text	10			0	360	Perpendicular and horizontal aspects of the centerline

SOP #9: Vegetation Database (continued).

tbl_Event	This table contains general information about the day of the visit to the site.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Event_ID	M	Text	50					Event identifier
Location_ID	M	Text	50					Link to tbl_Locations
Event_Group_ID	M	Text	50					Link to tbl_Event_Group
Protocol_Name	M	Text	100		Vegetation Monitoring, Vegetation Pilot Study			The name of the protocol governing the event
Start_Date	M	Date	8					Starting date for the event
Start_Time	M	Date	8					Starting time for the event
End_Time	M	Date	8					Starting time for the event
Second_Start_Time	MA	Date	8					This is the start time for the second day
Second_End_Time	MA	Date	8					This is the end time for the second day
Second_Date	MA	Date	8					This is the last day the site was surveyed
Multiple_Days	MA	Boolean	1		True / False			If checked, the survey was done over multiple days

tbl_Litter_Duff	This table contains information related to the litter and duff collected at the site.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Litter_5	M	Long Integer	4	0		0	100	This is the depth of the litter at 5 meters along the transect
Duff_5	M	Long Integer	4	0		0	100	This is the depth of the duff at 5 meters along the transect
Litter_10	M	Long Integer	4	0		0	100	This is the depth of the litter at 10 meters along the transect
Duff_10	M	Long Integer	4	0		0	100	This is the depth of the duff at 10 meters along the transect
Litter_15	M	Long Integer	4	0		0	100	This is the depth of the litter at 15 meters along the transect
Duff_15	M	Long Integer	4	0		0	100	This is the depth of the duff at 15 meters along the transect
Litter_20	M	Long Integer	4	0		0	100	This is the depth of the litter at 20 meters along the transect
Duff_20	M	Long Integer	4	0		0	100	This is the depth of the duff at 20 meters along the transect
Litter_25	M	Long Integer	4	0		0	100	This is the depth of the litter at 25 meters along the transect
Duff_25	M	Long Integer	4	0		0	100	This is the depth of the duff at 25 meters along the transect
Litter_30	M	Long Integer	4	0		0	100	This is the depth of the litter at 30 meters along the transect
Duff_30	M	Long Integer	4	0		0	100	This is the depth of the duff at 30 meters along the transect
Litter_35	M	Long Integer	4	0		0	100	This is the depth of the litter at 35 meters along the transect
Duff_35	M	Long Integer	4	0		0	100	This is the depth of the duff at 35 meters along the transect
Litter_40	M	Long Integer	4	0		0	100	This is the depth of the litter at 40 meters along the transect
Duff_40	M	Long Integer	4	0		0	100	This is the depth of the duff at 40 meters along the transect
Litter_45	M	Long Integer	4	0		0	100	This is the depth of the litter at 45 meters along the transect

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Duff_45	M	Long Integer	4	0		0	100	This is the depth of the duff at 45 meters along the transect
Litter_50	M	Long Integer	4	0		0	100	This is the depth of the litter at 50 meters along the transect
Duff_50	M	Long Integer	4	0		0	100	This is the depth of the duff at 50 meters along the transect

tbl_Event_Detail This table contains notes about the visit to a site.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Event_ID	M	Text	50					Event ID
Event_Notes	MA	Memo						General notes about the visit to the site

tbl_Incidental This table contains data about incidental observations of plant and wildlife species.

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Record_ID	M	Long Integer	4	0				Unique ID for this record
Species_Group	M	Text	20		Amphibians, Birds, Fish, Mammals, Reptiles, Vascular Plants			The general taxon group the species belongs too.
Scientific_Name	M	Text	100		from tlu_Species_List			Scientific name of the species based on ITIS lists
Common_Name	M	Text	255		from tlu_Species_List			Common name of the species based on ITIS lists
Observer	M	Text	100		from tlu_Contacts			First and last name of the individual who observed the incidental sighting
Date_Observed	M	Date	8					Date the sighting occurred
Habitat	O	Memo						General Habitat the species occured in or around
Description	M	Memo						General description of the sighting
Easting	MA	Long Integer	6	0				Easting Coordinate
Northing	MA	Long Integer	7	0				Northing Coordinate
Datum	MA	Text	10		NAD83, WGS84			Datum
Zone	MA	Text	10			10	10	Zone

SOP #9: Vegetation Database (continued).

tbl_Densiometer	This table contains data about the density of the canopy.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Event_ID	M	Text	50					Unique Id that links the densiometer records to the records in the events table
Data_ID	M	Text	50					Unique id for this record
Dens_Module	M	Long Integer	4	0		1	10	Module where the canopy cover was measure
Dens_Cover	M	Long Integer	10	0		0	100	Canopy cover measured using a densiometer

tbl_Disturbance	This table provides information about disturbances that are evident at the sites.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Dist_Agriculture	MA	Boolean	1		True / False			Evidence of agriculture activities in the plot
Grazing / Browse	MA	Boolean	1		True / False			Evidence of grazing activities in the plot
Logging	MA	Boolean	1		True / False			Evidence of logging activities in the plot
Fire	MA	Boolean	1		True / False			Evidence of fire activities in the plot
Natural	MA	Boolean	1		True / False			Evidence of natural (other then those currently listed) activities in the plot
Insect	MA	Boolean	1		True / False			Evidence of insect activities in the plot
Wind	MA	Boolean	1		True / False			Evidence of wind damage in the plot
Animal	MA	Boolean	1		True / False			Evidence of animals (other then those listed) activities in the plot
Other	MA	Boolean	1		True / False			Evidence of other activities in the plot
Describe_Other	MA	Memo	NA					Description of the other activities identified in the plot

tbl_Overstory_WBP	This table provides information about whitebark pine that occurs on the site.							
Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Data_ID	M	Text	50					Field data table row identifier
Event_ID	M	Text	50					Link to tbl_Events
Module	M	Long Integer	4	0		1	10	Module where the canopy cover was measure
Clump_Letter	M	Text	4					Clumps of stems in one general area
Alive/Dead	M	Text			Alive, Dead			State of the tree on the site

SOP #9: Vegetation Database (continued).

Field Name	Required	Field Type	Field Size	Decimal	Enumerated Domain	Min Value	Max Value	Field Description
Crown_Top	M	Long Integer				0	999	Number or cankers on the crown top
Crown_Mid	M	Long Integer	2			0	999	Number or cankers on the crown middle
Crown_Bot	M	Long Integer	2			0	999	Number or cankers on the crown bottom
Bole_Top	M	Long Integer	2			0	999	Number or cankers on the bole top
Bole_Mid	M	Long Integer	2			0	999	Number or cankers on the bole middle
Bole_Bot	M	Long Integer	2			0	999	Number or cankers on the bole bottom
Bole_Canker	M	Long Integer	2			0	999	Number or cankers on the bole
Branch_Canker	M	Long Integer	2			0	999	Number or cankers on the branch
Canker_Activity	M	Text	10		Active, Dead Tree, Inactive, N			Status of canker activity
MBP	M	Text	10		Active, Inactive			Determines presence of Mountain pine beetle
Bark Stripping	M	Text	10		Active, Inactive			Determines presence of bark stripping
Cones	M	Text	10		Active, Inactive			Determines presence of cones
Mistletoe	M	Text	10		Active, Inactive			Determines presence of mistletoe